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Internal Supply Chain of Indian Railways: A Case of CONCOR

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Abstract

Indian Railways, backbone of Indian economy and a premier transport organization of the country, is the largest rail network in Asia and is the world's second largest under one management. Given the scale and geographical spread of operations there are enormous complexities involved in coordinating various entities of organization to achieve strategic fit between internal supply chain objectives and overall organizational goals. In this paper a case of Container Corporation of India (CONCOR), a subsidiary of Indian Railways is taken to investigate the select issues pertaining to its supply chain. This study is exploratory in nature and a qualitative approach is used to analyze the case. Interviews were conducted with senior officials of CONCOR and a few shipping organizations to collect primary data and get an insight into operation of the company. A framework for study is developed from the internal supply chain perspective covering materials management, freight management, information and communication technology (ICT) initiatives, customer care management and some other new initiatives like cold chain and Fresh and Healthy Enterprises Limited (FHEL). Recent IT initiatives undertaken by the organization are also highlighted to understand the benefits offered by them to the entire operations. Some of the challenges are identified in internal supply chain in freight transportation and suitable recommendations have been proposed for the policy makers. This study has provided various research directions which can be taken up by the researchers for future investigation.

Keywords: *Internal Supply Chain, Railways, CONCOR, Freight movement*

1. Introduction

Though many studies are reported to identify various components of the flexibility as applicable to large scope of supply chain management but there are fewer studies about the relationship between supply chain flexibility and firm performance, which offers a research opportunity (Dangayach and Deshmukh, 2001). The concept of containerization is considered as the key innovation in the field of logistics which has revolutionized freight handling in the twentieth century.

Containerization is an inter-modal system of transporting the general cargo or products in lots, which are too small for the traditional bulk transportation system, using ISO standard containers. The goods can be easily moved from one location to another in these containers which can be loaded as it is onto the container ships, trucks, railroad cars and planes. Containerization reduces the transit time, offers a means of marketing for the producer that bulk systems cannot provide helps to reduce the inventory costs and increases reliability of delivery of supply. Quick changeovers from one transport system to another facilitate great deal of flexibility due to reduced setup and handling time and by avoiding of multiple handling of goods.

Aforesaid benefits are increasingly making the containerization a favorite mode of transportation amongst the organization competing on cost, flexibility and delivery speed. In order to further enhance logistic capabilities in terms of flexibility of operations, there is a need of making more and more use of internet and other emerging communication technology. Container traffic in India is expected to witness a rapid growth as a result of fast growth of Indian economy and consequent surge in international trade. Indian Railways, backbone of Indian economy and a premier transport organization of the country, is the largest rail network in Asia and is the world's second largest under one management. Given the scale and geographical spread of operations there are enormous complexities involved in coordinating various entities of organization to achieve strategic fit between internal supply chain objectives and overall organizational goals.

The objectives of this paper are to investigate how Indian Railways manage its internal supply chains, identify the issues involved in management of its supply chain and to suggest the improvement measures. In this paper a case of Container Corporation (CONCOR), a subsidiary of Indian Railways is taken to investigate the select issues pertaining to its supply chain.

This paper is organized in 7 sections; section 2 outlines the basic motivation for the study whereas section 3 describes the methodology used. Section 4 presents brief profile of Indian Railways in general and CONCOR in particular while section 5 covers the details of supply chain management initiatives of CONCOR. Section 6 details few important recommendations for the case organization and lastly conclusions are drawn in section 7.

2. Motivation for Study

Various sources for achieving flexibility in supply chains are discussed in literature (Tachizawa et al., 2007; Kumar et al., 2008). These sources come at a price and have to be viewed from the perspective of their potential of adversely affecting the sustainability of the supply chains. Concept of logistics flexibility and it's separation in to flexible logistics competence (physical supply and purchasing flexibilities) from capability (physical distribution and demand management flexibilities) along with definition of range that is the firm's ability to design, make, and distribute different products is suggested (Zhang et al.,2005; Naim et al. 2006). Range is high when the number of products is large and the degree of difference among the products is great. Also defined mobility that is the speed at which a firm can change from one product to another. But how one can achieve these flexibilities without increasing the cost and affecting the performance level has not been elaborated.

CONCOR is an interesting case to be studied from the point of view of flexibility in logistical activities of supply chains. Multiple handling and idle time for the need of consolidation are two important bottlenecks in transportation problems and multimodal, standardized, containerized freight movement provides the right solution to these problems and helps in achieving necessary flexibility. With intense global competition in businesses, CONCOR has to gear up to face new challenges from with in and outside by aligning its suppliers and match its policies and practices with internationally proved and tested techniques to meet and surpass the expectations of its customers. Other developing countries like China and Brazil have shown remarkable improvement in freight movement through containers and command a sizable share in world's total freight movement. Thus, there will be a need for CONCOR to adopt different strategies for growth in the changed external business environment due to private party participation in container train operation in India using Indian Railways infrastructure. Recently such facility is provided to 15 players. Since a 7%–8% growth in India's GDP is now considered achievable for the next 10 years, a 14% growth in container traffic annually could be expected for the period 2005–2015. Based on such assumptions, India's container traffic will rise to 8.66 million twenty-foot equivalent unit (TEUs) by 2010 and 16.68 million TEUs in 2015 (Paul, 2005).

Along with increase in container traffic there will be a need for expansion of ports and present handling capabilities of India ports. There is no question that India's ports need to upgrade their facilities and capacity urgently or else they will suffer from severe bottlenecks as trade volume expands. Chandrasekaran and Kumar (2004) indicated that India's ports are relatively inefficient. Therefore, it is critical for India to strengthen its container handling operations and make them more efficient and smooth flowing. India's cargo volume is growing at a 20 percent annual clip and to reduce pre/post shipment procedures and time, port authorities should provide single window clearance and single paper clearance to handle pre/post container shipment formalities. (Wu and Lin, 2008)

3. Research methodology

This study is exploratory in nature. A qualitative approach is used to analyze the case of CONCOR. The primary data was collected through interviews with senior officials of CONCOR and a few shipping organizations to assess the situation. The secondary data is collected through the official websites and published documents of Indian Railways and associate organization like Ministry of Railways, Indian Railways, CONCOR India, IRCTC, Railtel India. A framework for study is developed from the internal supply chain perspective covering materials management, freight management, information and communication technology (ICT) initiatives, customer care management and new initiatives like cold chain and Fresh and Healthy Enterprises Limited (FHEL).

4. Profile of the Indian Railways (IR) and CONCOR

Railways worldwide have huge responsibility of hauling major chunk of the goods and play a very vital role in any countries supply chains. In Indian context, it gains all the more importance as other modes of transport like roads and air are not yet fully developed in terms of infrastructure and have their own constraints. Indian Railways, being a major player in supply chains of its customers, needs to align its own supply chain to be efficient and cost effective. Although it's a commercial organization that runs on the basis of profit and loss, it has a larger societal

responsibility to provide safe, speedy and cheap transportation to both passengers and goods. Given the scale and geographical spread of operations there are enormous complexities involved in coordinating various entities of organization to achieve strategic fit between internal supply chain objectives and overall organizational goals.

Indian Railways runs around 11,000 trains everyday, of which 4,000 are goods trains. It is a front runner revenue generator for Indian Government. In the year 2008-09 freight loading was observed at 833 million tonnes (MT) (growth of 5%) where as traffic receipts increased by 11.4 % to reach Rs 79,862 cr. As per the budget estimates for coming year freight loading is targeted at 882 MT – an increment of 49 MT and Gross Traffic Receipts (GTR) estimated at Rs 88,419 cr i.e. Rs 8,557 cr more than 2008- 09 (Rail Budget 2009-2010).

One of the important subsidiaries of Indian Railway CONCOR is a public sector unit under Government of India which works in close coordination with Indian Railways for transportation of goods for exports and domestic markets. It was incorporated in March 1988 under the companies act, and commenced operation from November 1989 taking over the existing network of 7 inland container depots from the Indian Railways.

It has the largest network of 57 ICDs/CFSs (container freight station). In addition to providing inland transport by rail for containers, it has also expanded to cover management of ports, air cargo complexes and establishing cold-chain. It plays the role of promoting containerization in India by virtue of its modern rail wagon fleet, customer friendly commercial practices and extensive use of Information Technology. The company developed multimodal logistics support for India's international and domestic containerization and trade. Though rail is the main stay of it's transportation plan, road services are also provided to cater to the need of door-to-door services, both in the international or domestic freight movement.

CONCOR carries a huge variety of goods ranging from mineral ores, fertilizers and petrochemicals, agricultural produce, iron & steel, multimodal traffic etc. Ports and major urban areas have their own dedicated freight lines and yards. Many important freight stops have dedicated platforms and independent lines.

Indian Railways generates 70% of its revenues and most of its profits from the freight sector, and uses these profits to cross-subsidise the loss-making passenger sector. However, competition from trucks, which offer cheaper rates, has resulted in declining freight traffic in recent years. Since the 1990s, Indian Railways has switched from small consignments to larger container movement this has helped speed up its operations. Most of its freight earnings come from rakes carrying bulk goods such as coal, cement, food grains and iron ore. Recently, Indian Railways introduced a special 'Container Rajdhani' or CONRAJ, for high priority freight. The highest speed notched up by a freight train is 100 km/h (62 mph) for a 4,700 metric tonne load.

Physical Performance

Seventeen years of the Company's operations have seen the traffic grow from a level of 52087 TEUs in 1989-90 to 2105266 TEUs in 2006-07. Total traffic handled by CONCOR, separately for international and domestic streams, during the last decade clearly brings out the success story of CONCOR's growth. Figure 1 gives international and domestic tariff handled till 2006-07.

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5. Supply Chain Management of CONCOR

Railways, all over the world, is one of the most important components of supply chains as it provides a safe, cheaper, dependable, and efficient mode of transpiration for both passengers and goods.

The geographical spread of Indian Railways is very large and thus managing its supply chain poses unique challenges. The variety of core inventory items (wagons, locomotives, containers, fuel, coal, electricity supply, maintenance, repair, overhaul (MRO), civil works, mechanical and electrical engineering works etc.) and support services (catering, ticketing, passenger's amenities, information system, customer support system, safety and security, station management etc.) are enormous and managing the supplier base for timely supply in full quantity is quite challenging. A general framework for Indian Railway is presented as Figure 2 covering materials management, freight management, information and communication technology (ICT) initiatives, customer care management and new initiatives.

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In this paper, the freight management is being focused which is managed CONCOR. Thus, the framework for study of supply chain of CONCOR is developed with four distinct building blocks namely a) structural, b) functional, c) informational, and d) new initiatives undertaken by CONCOR. Building blocks are shown in Figure 3.

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A) Structural

The structural block of CONCOR's internal supply chain consists of network of terminals (ICDs / Dry ports), handling equipments, wagons and containers. CONCOR's terminals provide a spectrum of facilities in terms of warehousing, container parking, repair facilities, and even office complexes. As container freight station (CFS) operators, CONCOR adds value to the logistics chain by offering services such as:

- Transit warehousing for import and export cargo
- Bonded warehousing, which enables importers to store cargo and ask for partial releases, thereby deferring duty payment
- Less than Container Load (LCL) consolidation, and reworking of LCL cargo at nominated hub
- Air cargo clearance using bonded trucking

In the area of domestic business door pick up and door delivery services are the most popular. It also uses its terminal network to plan hub and spoke movements that allow single customers to move cargo to multiple locations simultaneously, with CONCOR taking care of the distribution and re-distribution requirements.

Network

CONCOR has the largest network of 57 inland container depots (ICDs)/CFSs in India. In addition to providing inland transport by rail for containers, it has also expanded to cover management of ports, air cargo complexes and establishing cold-chain. The key value offering is a single-window facility coordinating with all the agencies and services involved in the containerized cargo trade, ranging from

customs, gateway ports, and railways, to road haulers, consolidators, forwarders, custom house agents and shipping lines. To achieve a high degree of flexibility, it offers packages designed to provide the most cost-effective combination of road and rail. This enables it to offer services which can be individually tailored to meet varying customer's requirements, with minimal efforts. Table 1 gives details of the terminal network of CONCOR.

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Handling Equipment

CONCOR has generally followed a policy of organizing specialized cargo/container handling services by deployment of state-of-the-art equipments on contractual basis. In addition, at ICD Tughlakabad, in Delhi, which is the company's flagship terminal, it also owns, operates and maintains the most modern and sophisticated handling equipments such as a rail mounted gantry (RMG), rubber tyre gantries (RTGs), and loaded and empty handling reach stackers.

Wagons

After starting operations with make-shift container wagons that were provided by the Indian Railways, CONCOR started acquiring state-of-the-art high speed container flats (BLC wagons), capable of running at 100 kmph. These have been progressively introduced on major container circuits in the last three years, as a result of which transit times have reduced and service quality has shown considerable improvement. Nearly 1900 such wagons are already deployed in service and it plans to expand that fleet every year to cater to the growth in business as well as to replace outworn rolling stock. CONCOR has also purchased some 1300 container flat wagons from Indian Railways, which have been since upgraded and retrofitted to improve its service quality and transit times.

Containers

Various type containers are used for dry cargo such as:

a) 20/40 ft. conventional end open containers: These are usually built to ISO standards, and used for the movement of conventional dry cargo. For domestic movement, CONCOR has inducted a fleet of approx. 12000 such 20 ft. containers either under direct ownership or on lease for internal movements within the country.

b) 20/40 ft High Cube containers: These containers offer the added advantage of extra volumetric capacity due to their additional height, and are especially useful of movement of light but bulky cargo.

c) 20 ft Side Access Containers: These containers are used exclusively for domestic freight movements within the country. They offer the advantage of having doors on the side panels, and this makes it convenient for use in locations where chassis stuffing operations have to be used. CONCOR has currently about 3300 such self owned domestic side access containers in its fleet.

d) 22 ft High Cube Domestic Containers: These containers have been exclusively introduced by CONCOR for the purpose of carrying cargo that requires greater volumetric capacity or container length. CONCOR has currently about 2000 such self owned domestic 22ft containers in its fleet.

B) Functional

CONCOR's core business is characterized by three distinct activities, that of a carrier, a terminal operator, and a warehouse operator. Customers are required to move the goods to CONCOR through freight forwarding agents who usually provide the container along with facility of 3PL for road transportation. CONCOR is responsible for providing suitable wagon for containers along with loading/unloading facilities and temporary storage during the transit. Once the complete rack is ready, Railways took charge to route through designated roots for the domestic and overseas destinations. The shipping companies are responsible for overseas operations and after completing the formalities like custom clearance, insurance, etc. route them to ports for further shipping for overseas destinations. Financial institutes and banks provide necessary documentation required for money flows all through the chain. Figure 4 shows the schematic diagram of various functions and partners involved in supply chain of freight movement through CONCOR.

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C) Informational

Infotech Capabilities supporting Supply Chain

IT forms the backbone of any service industry, where information correlates directly with improved levels of efficiency. In the transport sector, antiquated, cumbersome paper-based procedures cause an enormous waste of time and money. All too often, goods move through transport systems at a frustratingly slow speed, especially in developing countries. The efficiency of the logistic services can be significantly improved by making use of information and network technologies and forging working relationships amongst various channels partners.

A primary component of CONCOR's overall business strategy has been the use of an advanced information system to coordinate and improve the efficiency of its operations. A container and cargo logistics information system went online at company's ICD at Tughlakabad in 1994 and most other facilities have been equipped with computer systems to monitor traffic movement and maintain inventory records.

CONCOR is using various online applications like Export/Import Terminal Management System (ETMS), Domestic Terminal Management System (DTMS), Oracle Financials-ERP, and HR-Payroll system that are running over VSAT based hybrid network.

Information system is developed for online container tracking and entry of unloading/loading of containers on to wagons. Interface software is in place for automatic updation of entries in the database. The system enables any user to query the system either through LAN or Web to get the latest status and location of a container in the yard. Facility for electronic filing (e-filing) of commercial documents of Container and Cargo Logistic System (CCLS) has been provided to customers. This facility enables customers like shipping lines, importers and exporters to file the required documents online for processing and take necessary printouts of processed output through web. Digital signatures have been integrated with e-filing to make the system more secure. An integrated track and trace system is also implemented on CONCOR website for providing container tracking details, train summaries and current train running position. Table 2 shows various functionalities covered by information system.

< Take in table 2 here >

ETMS Web Queries

ETMS (EXIM Terminal Management System), is a centralized computer system, designed and developed to suit the working of all EXIM terminals in India. In order to provide online information of containers to customers, spread across the world, web interface of ETMS queries has been developed. All customers registered for this facility are provided a unique user-id and password to access the queries through the website. Through this interface as shown in Table 3, any customer can track and trace his containers online lying at any of CONCOR's EXIM terminals at any point of time.

< Take in table 3 here >

D) New Initiatives

The following new initiatives are being taken to face challenges imposed by private entrants:

Cold Chain

It provides customized end-to-end cold supply chain services capable of handling the produce from the farm gate to the end customer to eliminate wastage by integrating all activities from pre and post harvest management to storage and logistics for the fresh produce. Shortage of cold storage facilities and refrigerated transport leads to inefficiency in handling perishable products which manifest itself into wastages. The Cold Chain initiatives have been taken for the following reasons:

- To eliminate the wastage happening post Harvest which is being estimated at 25% of total produce or approx Rs. 50000 Cr US $ 10 Billion.
- Indian Agriculture sector accounts for 26% of country's GDP, produces 64% employment and 18% of country's export.
- India is 2nd largest producer of Fruits & Vegetable in the world and 2nd largest vegetable Exporter.

Fresh and Healthy Enterprises Limited

As a part of its overall business strategy for expansion and diversification of its core business, CONCOR is increasingly focusing on exploiting emerging opportunities in agro based business. To this end, CONCOR has formed a separate company called "Fresh and Healthy Enterprises Limited" in February 2006. Also the cold chain project initiated by CONCOR is a part of its initiatives for diversification. It performs a wide range of functions like procurement, import, transport, handling, storage, grading and packing including branding, distribution, marketing, export and selling of fresh fruits, vegetables, frozen foods etc.

6. Supply chain challenges identified from the study

The framework from the supply chain perspective described above in the study provided the insight of various operations and entities involved in operations of CONCOR. However, there are many areas where improvement is possible. The following challenges are identified through personal interviews and discussion with senior managers of CONCOR and few shipping agencies located in Delhi:

- Higher lead times for loaded containers (more than 72 hours)

- Higher lead time for retrieval of empty containers (more than 36 hours at times)
- Shortage of wagons
- Ware housing space limitation
- Lack of modern management techniques in warehousing
- Loss/damage and pilferages during transit
- Insufficient automation of material handing at depots and railway stations
- Space limitation for expansion for existing depots
- Poor linking with other modes of transport
- Containerized movement through public private partnership.
- Development of integrated multi-modal logistics parks
- Technology up gradation and modernization including application of IT.
- Construction of dedicated Freight Corridors

7. Conclusions

This study is based on a case of CONCOR which is premier public sector unit of India providing flexible intermodal shipping of cargo through standardized containers. Many new initiatives and modernization efforts have been taken to streamline the internal supply chain of organization. This study, being exploratory in nature, identifies and provides structure, current status and challenges of supply chain. The researchers and practitioners can be benefitted by getting the glimpses of current practices and a scope of benchmarking these practices with the best in the world to identify scope of further improvement to attain competitiveness. A few of the recommendations to the case organization are as follows:

- Revamping of the tracks to increase maximum speed of the trains.
- Dedicated tracks and freight corridors between major destinations.
- Identification and coding of containers should be modernized using devices like RFID etc.
- Linking with other modes of the transportation should be improved to facilitate easy inter-modal journey.
- Better linking of information technology for high responsiveness towards customer's needs like booking of containers, tracking the status, and various other related reports.

sis scope of further in-depth studies in analyzing the internal supply chain of CONCOR.

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Website

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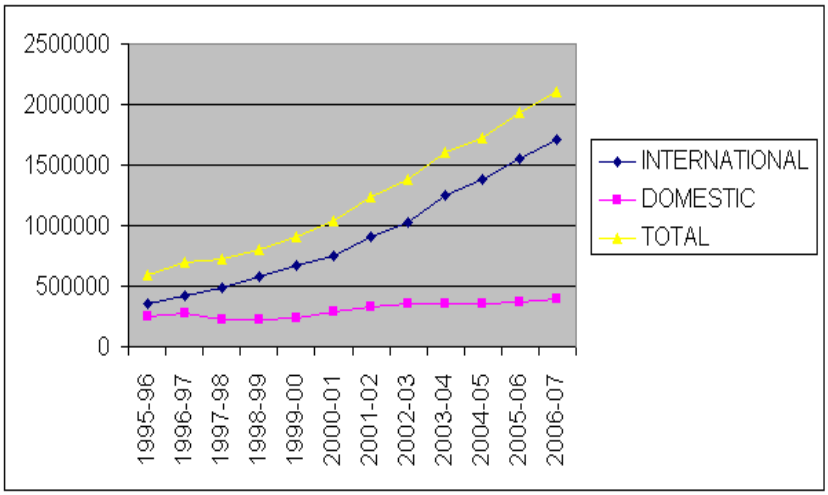

(Source:http://www.concorindia.com/)

Figure 1: International and domestic tariff handled in TEUs

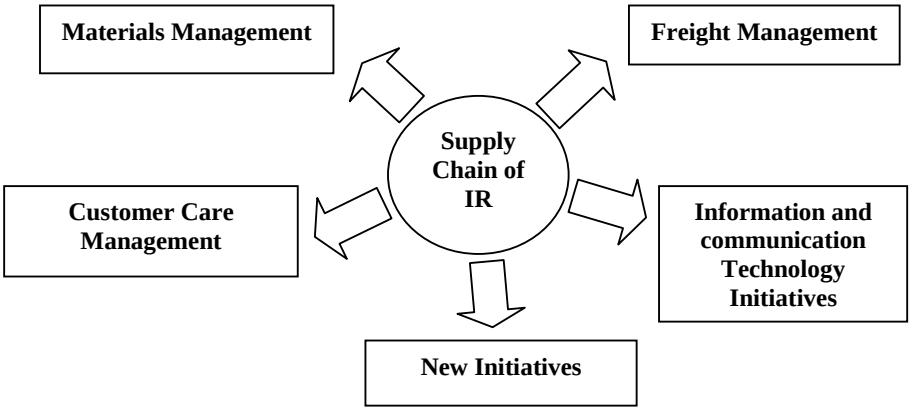

Figure 2: Framework of the Study

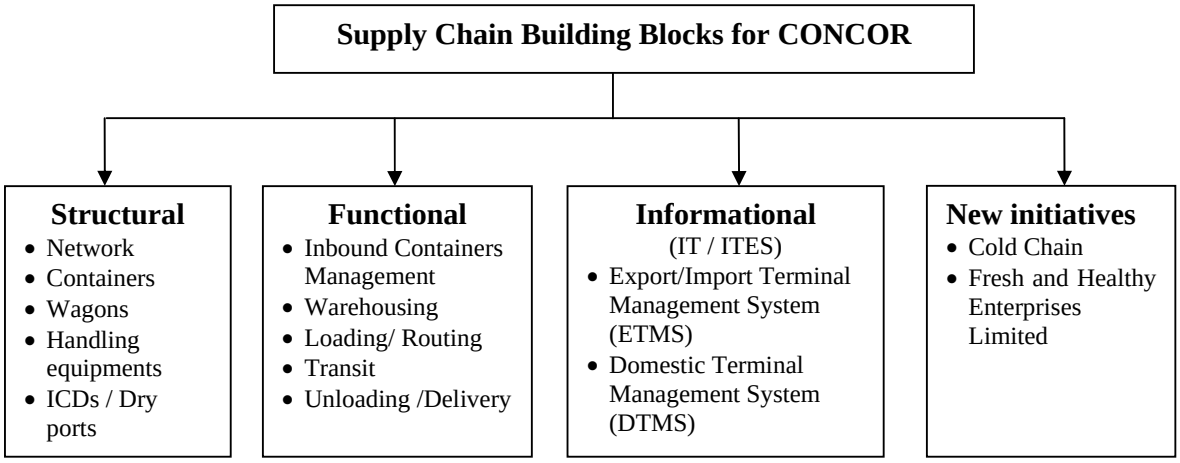

Figure 3: Building blocks for internal supply chain of CONCOR

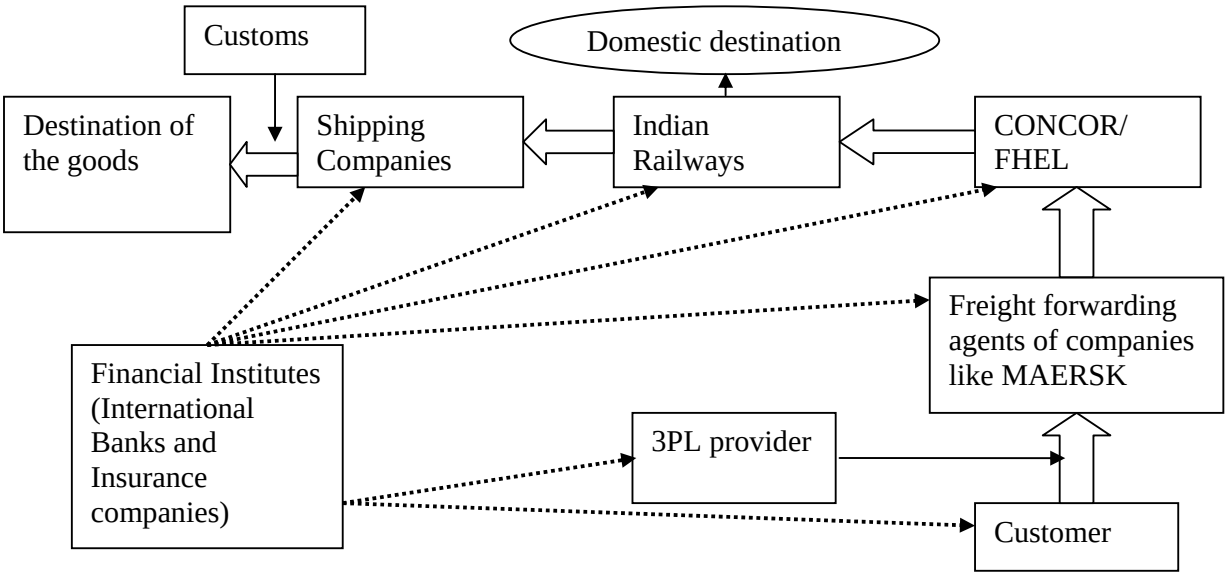

Figure 4: Supply chain of freight movement through CONCOR

Table 1: Terminal Networks of CONCOR

S. No	Region	Places
1.	Northern Region	Tughlakabad (Delhi), Panipat, Moradabad, ICD DDL (Ludhiana), Ballabgarh, Jaipur, Jodhpur, Rewari, DCT/TKD, Kharia Khangar, Gotan, DCT Phillaur, Moga, Gurgaon (Planned), Sonepat, Dhappar, Surnasi (Under Construction), Khemli (Planned)
2.	Western	New Mulund (Mumbai), Mulund (Mumbai), Pithampur (Indore), Miraj, Chinchwad (Pune), Dronagiri Node(Navi Mumbai), Turbhe / DOM (Navi Mumbai), Ratlam
3.	Eastern Region	Amingaon (Guwahati), Shalimar (Kolkata), Majerhat (CTKR), Kolkata Port (Kolkata), Jamshedpur, Haldia, Fatuha (Patna), Balasore
4.	Southern Region	Whitefield (Bangalore), Irugur , Tondiarpet(Chennai), Madurai, Harbour of Chennai (HOM), Cochin (CHTS), Milavittan(Tuticorin), Salem Market/DOM, Tiruppur
5.	Central Region	Nagpur / Daulatabad (Aurangabad) / Bhusawal/ Raipur / Mandideep
6.	South Central Region	Sanatnagar (Hyderabad), Guntur, Visakhapatnam, Desur
7.	North Western Region	ICD Sabarmati (Ahmedabad), Vadodara (Channi), Vadodara, Gandhidham, DCT Khodiyar, Ankleshwar, Mundra, Pipavav
8.	North Central Region	Dadri, Agra, Juhi Kanpur, Malanpur (Gwalior), Rawtha Road, Madhosingh (under construction)

(Source:http://www.concorindia.com/)

Table 2: Functionalities covered by Information system

S. No.	Functionalities Covered	Details
1.	Imports	1. Book Delivery of Containers 2. Filing of Request for Customs Examination Job-order 3. Generation of Gate Pass for Cargo/Container Removal
2.	Exports	1. Filing of CFN (Cargo Forwarding Note) 2. Export Container Booking 3. Empty / Loaded Container Arrival / Departure Permits 4. Leasing of Empty Containers between Shipping Lines
3.	Billing	Customer billing takes place at all the stages automatically and the amount gets debited from his pre- deposit amount being maintained in the system.
4.	Queries / Reports	Various Queries and Reports have been provided to keep track of containers at every stage and also to find out due amount to be paid to CONCOR.
5.	Net Banking Module	Net Banking Module has been included, through this module, any customer can credit his Pre-Deposit Account, operational in CCLS system from any of the major banks directly

(Source:http://www.concorindia.com/)

Table 3: Various container related queries under ETMS interface

S. No.	Query	Functionality
1	Container Details	Just by entering container number, one can find out present status of the container.
2	Shipping Line wise Inventory	Any registered shipping line can find out its inventory of Import / Export / Empty containers at any of the terminals online.
3	List of containers Arrived	One can find out the list of containers that have arrived at a terminal during any specific period.
4	List of containers Departed	One can find out the list of containers that have departed from a terminal during any specific period.
5	Container Activity Record	This option provides history of a container specifying different activities that have been completed from arrival to departure.
6	Import Container Query	This query is specific to Import containers.
7	Export Container Query	This query is specific to export containers.
8	PDA Balance Enquiry	Customer can find out the available balance amount in his Pre-deposit Account at any of the terminals online.

(Source:http://www.concorindia.com/)